



## Climate change and human health: Spatial modeling of water availability, malnutrition, and livelihoods in Mali, Africa

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### Abstract:

This study develops a novel approach for projecting climate trends in the Sahel in relation to shifting livelihood zones and health outcomes. Focusing on Mali, we explore baseline relationships between temperature, precipitation, livelihood, and malnutrition in 407 Demographic and Health Survey (OHS) clusters with a total of 14,238 children, resulting in a thorough spatial analysis of coupled climate-health dynamics. Results suggest links between livelihoods and each measure of malnutrition, as well as a link between climate and stunting. A 'front-line' of vulnerability, related to the transition between agricultural and pastoral livelihoods, is identified as an area where mitigation efforts might be usefully targeted. Additionally, climate is projected to 2025 for the Sahel, and demographic trends are introduced to explore how the intersection of climate and demographics may shift the vulnerability 'front-line', potentially exposing an additional 6 million people in Mali, up to a million of them children, to heightened risk of malnutrition from climate and livelihood changes. Results indicate that, holding constant morbidity levels, approximately one quarter of a million children will suffer stunting, nearly two hundred thousand will be malnourished, and over one hundred thousand will become anemic in this expanding arid zone by 2025. Climate and health research conducted at finer spatial scales and within shorter projected time lines can identify vulnerability hot spots that are of the highest priority for adaptation interventions; such an analysis can also identify areas with similar characteristics that may be at heightened risk. Such meso-scale coupled human-environment research may facilitate appropriate policy interventions strategically located beyond today's vulnerability front-line. (C) 2011 Elsevier Ltd. All rights reserved.

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### Resource Description

#### Communication:

resource focus on research or methods on how to communicate or frame issues on climate change; surveys of attitudes, knowledge, beliefs about climate change

A focus of content

#### Communication Audience:

audience to whom the resource is directed

Policymaker, Public



# Climate Change and Human Health Literature Portal

## **Early Warning System:**

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

## **Exposure :**

weather or climate related pathway by which climate change affects health

Food/Water Security, Food/Water Security, Precipitation, Temperature

**Food/Water Security:** Food Access/Distribution

## **Geographic Feature:**

resource focuses on specific type of geography

None or Unspecified

## **Geographic Location:**

resource focuses on specific location

Non-United States

**Non-United States:** Africa

**African Region/Country:** African Country

**Other African Country:** Mali

## **Health Impact:**

specification of health effect or disease related to climate change exposure

Developmental Effect, Malnutrition/Undernutrition

**Developmental Effect:** Other Functional Deficit

## **Intervention:**

strategy to prepare for or reduce the impact of climate change on health

A focus of content

## **Mitigation/Adaptation:**

mitigation or adaptation strategy is a focus of resource

Adaptation

## **Model/Methodology:**

type of model used or methodology development is a focus of resource

Exposure Change Prediction

**Population of Concern:** A focus of content

## **Population of Concern:**

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populations at particular risk or vulnerability to climate change impacts

Children, Low Socioeconomic Status

## **Resource Type:**

format or standard characteristic of resource

Research Article

## **Timescale:**

time period studied

Short-Term (

## **Vulnerability/Impact Assessment:**

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content